

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Spectrum Policy Task Force Report)	ET Docket No. 02-135
)	

To: The Commission

COMMENTS OF LOCKHEED MARTIN CORPORATION

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Lockheed Martin Corporation (“Lockheed Martin”) hereby responds to the Commission’s November 25, 2002 Public Notice seeking comment on the Spectrum Policy Task Force Report (*Task Force Report or Report*).¹

I. INTRODUCTION/SUMMARY

Lockheed Martin appreciates the opportunity to comment on the *Report* as it brings to the fore a wide range of issues that affect all users and beneficiaries of spectrum-based technologies – whether commercial or non-commercial, terrestrial or satellite, civilian or military, domestic or international. As a result, the spectrum management recommendations contained in the *Report* have implications for a far broader set of constituents than just those regulated by the Commission.

Lockheed Martin has limited itself to commenting selectively on a few issues in light of representations of members of the Task Force that the *Report’s* general recommendations will be raised for comment in individual proceedings; however, Lockheed Martin emphasizes its general support for spectrum policies that are credibly based on the fundamental premise that arrangements that promote

¹ Public Notice, Commission Seeks Public Comment on Spectrum Policy *Task Force Report*, ET Docket 02-135, FCC 02-322 (Nov. 25, 2002).

spectrum flexibility and spectrum access may not generate interference into existing, licensed systems. Also, Lockheed Martin generally supports spectrum policies that promote research and development in new technology to improve spectrum efficiency or exploitation of higher frequency bands, as well as improve the existing licensing process in terms of transparency and timing.

II. BACKGROUND

Lockheed Martin holds approximately 400 hundred Commission licenses and authorizations, including: (1) experimental licenses to support significant research and development of advanced technology products and services; (2) numerous industrial private land mobile authorizations which enable Lockheed Martin to self-provide critical internal communications on a “24/7” secure, reliable basis in support of manufacturing plants and other facilities; (3) numerous earth station authorizations to perform telemetry, testing and communications functions and in-orbit transfers, and to provide satellite communications services to both civil and military customers worldwide; and (4) a space station authorization for the MARISAT satellite system.

Lockheed Martin is participating in this proceeding as a global enterprise principally engaged in the research, design, development, manufacture and integration of advanced-technology systems, products and services for both commercial and government customers worldwide. The corporation has extensive experience and technology leadership in command, control communications, computers and intelligence reconnaissance and surveillance systems (C4ISR). Lockheed Martin also provides technical consulting services and develops state-of-the-art wireless and satellite networking products for its commercial and government customers worldwide. Lockheed Martin's four core businesses are systems integration, space, aeronautics, and technology services, and it has more than 300 government and industry partnerships in 30 countries.² As demonstrated herein, access to spectrum, whether it be

² Lockheed Martin also holds significant investments in communications companies, such as Intelsat, Inmarsat, Asia Cellular Satellite (AcES), and New Skies Satellites.

in the UHF, VHF, C-band, X-band, Ku-band, S-band, L-band, Ka-band or higher, is an integral and necessary pre-requisite to many of Lockheed Martin's products, systems and services as illustrated herein.

Lockheed Martin is a leading global manufacturer of space systems for telecommunications, science, environmental, and national defense/homeland security applications, with over 45 years of experience launching more than 860 spacecraft which have accumulated over 1,600 years of service in orbit. Lockheed Martin is also a leading supplier of commercial and government communication satellites offering a wide variety of platforms – geostationary and non-geostationary – and supporting a wide range of services including fixed satellite, direct broadcast, mobile, multimedia, Internet, and broadband. In commercial telecommunications alone, Lockheed Martin has launched 167 commercial telecommunications satellites, with 120 in orbit at the end of 2001. Lockheed Martin supplied the Global Positioning System (GPS) IIR satellites, and is currently modernizing the GPS IIRM satellites as a transition to next generation (GPS III).

The corporation, through its wholly-owned subsidiary COMSAT General Corporation (COM-GEN), is one of the largest providers of commercial fixed and mobile satellite communications for demanding and time-sensitive applications worldwide. Such applications integrate terrestrial and satellite communications services, host-nation negotiations, earth station licensing and operation, security packages and domain expertise.

In the field of systems integration, Lockheed Martin is, for example, a leading provider of air traffic automation systems to the FAA and civil aviation agencies worldwide,³ focusing on highly complex information systems that integrate communications, navigation and surveillance/air traffic

³ Lockheed Martin has delivered, for example, air traffic management systems, large and small, such as the Area (En Route) Control Centers in the UK, Germany, Argentina, Korea, Taiwan, and Terminal Control Centers in China.

management and are used by airport/terminal management, military and civilian aircraft, operations and flight services, satellite and ground weather systems, and air traffic control engineering, integration and support services. In this context, Lockheed Martin submitted to, and has pending before, the Commission, an application for authority to launch and operate a global system of geostationary satellites, called the Regional Positioning System, which is designed to provide local and wide area GPS augmentation to the FAA, enabling GPS to be used as the backbone for future air traffic navigation.

For more than 30 years, Lockheed Martin has also been at the forefront of the design and construction of antennas used throughout various parts of the electromagnetic spectrum. Lockheed Martin provides structural and mechanical design, site preparation and construction, microwave feeds, and radio frequency transmitting and receiving systems for satellite communications antennas, radio telescopes, optical telescope mounts, high-speed tracking antennas, and multi-band receiving systems.⁴

Lockheed Martin is a global leader in the design, production and full systems support of military aircraft such as the F-16 and F-22 fighters; the versatile airlifter, the C-130J; the first operational stealth fighter, the F-117; and the multi-service, multi-mission Joint Strike Fighter of the future. The corporation's aircraft factories feature some of the most advanced production technologies in the world, such as laser ultrasonic inspection and laser direct manufacturing. Access to spectrum enables not only the flight testing and telemetry of these platforms, but also the increasingly intensive bandwidth requirements for their on-board applications. For example, as noted by Steven Price, Deputy Assistant Secretary, Department of Defense, during his June 11, 2002 appearance before a Senate Commerce Committee hearing, the Joint Strike Fighter platform utilizes approximately 20 different frequencies to support mission critical functions

⁴ In fact, Lockheed Martin developed and installed NEXRAD, an advanced nation-wide network of highly-sensitive Doppler weather radars at some 160 facilities around the U.S., including Hawaii and Alaska, serving as the principal local weather sensor.

Lockheed Martin is also responsible for ensuring successful integration of new and legacy technologies for dispatching police, responding to emergency and non-emergency calls, communication with police in the field, and the provision of new operations centers for the London Metropolitan Police Service. Lockheed Martin was also selected as the system integrator for the Pennsylvania State Police's statewide rollout of its Incident Information Management System (IIMS). IIMS, a statewide top priority, will enable the State to completely modernize its data systems for statewide emergency call taking and dispatch, mobile computer software evidence, criminal and investigative management systems and modernization of both standard dial and mobile phone access to E-911.

III. SPECTRUM ALLOCATION MODELS

Based upon Lockheed Martin’s broad experience with the various methods of spectrum management, including authorizations requiring coordination with the National Telecommunications and Information Administration, it concurs with the Task Force Report’s conclusion that a “one size fits all” approach to spectrum management would be wholly inadequate, and believes such an approach would actually hinder the Commission’s policies to support advanced new technologies and services.⁵ Rather, an appropriate balance among, and implementation of, a variety of spectrum management methods will more likely lead to a regulatory environment conducive to investment in new technologies and applications.

A single spectrum allocation model is neither efficient nor practical. It is not intrinsically inefficient to regulate different services in different ways; the spectrum allocation method does not make a

⁵ The *Report* identifies three primary spectrum allocation models – “exclusive,” “commons,” and “command-and-control.” *Task Force Report* at 35. The *Report* recognizes that these models are “not mutually exclusive and that elements from more than one model may be incorporated in any given spectrum band or proposed use.” *Id.* Indeed, the *Report* emphasizes that there can be no “one size fits all” approach to spectrum allocation. *Id.* at 36. As a general matter, however, the *Report* concludes that the Commission should move away from solely using the traditional “command-and-control” model.

service or technology more or less efficient or more or less prone to innovation and technological advances. Indeed, new, advanced technologies and services can and do emerge under each of the proposed allocation models. Further, the results of any spectrum management regulatory reform can have significant implications on the effective functioning of spectrum-based products, systems or services – whether it is a police officer’s emergency dispatch system, a radar’s providing an early warning, a commercial airliner taking off on time or a satellite being placed in its proper orbit – that very much depend upon a spectrum management framework that provides reliable, predictable and consistent rules for access to spectrum. Therefore, the way in which this critical resource is managed across service categories and user groups is of fundamental importance. Thus, the Commission must recognize that there can be no efficient “one size fits all” approach and should use a combination of command-and-control, “exclusive” and “commons” models depending on the characteristics of the service and the spectrum bands and issues regarding incumbent licensee rights.

IV. THE INTERFERENCE TEMPERATURE MODEL

The Task Force states that Commission spectrum management policy “must be based on clear definitions of the rights and responsibilities of both licensed and unlicensed spectrum users, particularly with respect to interference and interference protection.”⁶ Lockheed Martin agrees. The Commission must maintain constant vigilance to ensure that the availability and reliability of existing services will not be diminished due to increases in the noise floor and the diversion of limited resources to interference mitigation. Lockheed Martin submits, however, that the Task Force’s proposal to permit the creation of underlays and easements through its “interference temperature model” for interference protection fails to meet this goal.

⁶ *Id.* at 3.

Under the Task Force’s proposal, the Commission would determine the “‘worst case’ scenario in which a receiver would be expected to operate” for a particular band.⁷ This worst case scenario would be deemed the “interference temperature” for services operating in the band. The Commission would then create easements to permit unlicensed operations below the interference temperature in spectrum previously awarded through an exclusive licensing process.⁸ The proposed interference temperature model, however, creates substantial uncertainty regarding the protections against harmful interference, would undermine the fundamental nature of an exclusive allocation, and would degrade the performance of currently deployed systems.

Even more significant, the proposed interference temperature model raises numerous enforcement concerns, particularly where the Commission would permit an “underlay” of unlicensed uses to share spectrum with incumbent, exclusive licensees.⁹ Indeed, the Task Force’s proposal avoids the fundamental question of how the Commission will police harmful interference in the context of “interference temperature” which is effectively the aggregate effect of multiple low power level transmissions in a given band. The concept of an interference temperature in an underlay scenario raises the questions of how the Commission will identify which transmitters exceed the interference temperature and how these identified transmitters can be compelled to remedy harmful interference. It is unclear that, as a practical matter, an entire category of unlicensed users can be identified and then made to remedy, as a group, the fact that the interference temperature was exceeded. This highlights the fact that the underlay of unlicensed uses does not allow any actual remedial action by the Commission

⁷ *Id.* at 28.

⁸ *See id.* at 30.

⁹ Lockheed Martin supports the Commission’s ongoing efforts to improve its enforcement programs, and believes that the Commission should develop and maintain a well-equipped and technically competent enforcement bureau that is able to quickly respond to and address interference issues.

when interference problems arise. The only remedy to unlicensed use interference caused by unlicensed users to date has been prospective in nature which only results in the unlicensed interferors remaining in the market for their life cycle. The Task Force does not address the fact that the Commission will have no information regarding the number of unlicensed devices in a given band, and has offered no recommendation on how to address this significant gap between theory and reality.

Moreover, adoption of the interference temperature model will degrade the performance of currently deployed systems and may in fact make future systems more costly, or inhibit the deployment of new technologies by incumbent services in those bands subject to an interference temperature. Again, the interference temperature model would analyze “worst-case” interference conditions for receiver operations under *current* technology and usage conditions and then permit unlicensed usage up to that “worst-case” scenario. A central issue for satellite operators, for example, is that licensed users have a heightened sensitivity to any increased noise or interference because they are already operating systems that are optimally engineered based upon the existing noise floor. Further, the shelf-life of such systems may reasonably be longer than systems devoted to other uses. Consequently, forcing licensees to engineer their systems to accommodate any prospective worst-case interference conditions will ultimately degrade the efficiencies and therefore the quality of service provided by deployed systems. Furthermore, licensees would be required needlessly to spend greater economic resources on future systems to accommodate the increased power requirements for achieving the desired signal-to-noise ratio.

Adoption of an interference temperature model as a means of regulating interference could also have the perverse effect of limiting new providers ability to enter an existing market. Under an interference temperature regime, the first unlicensed user (or first few users) in a spectrum band could consume the entire allowable interference temperature increase, thereby barring many low level users from accessing that spectrum. For example, in the context of satellite services, an interference temperature

would be directly related to the number of satellites currently radiating. New satellites, therefore, could not be added without increasing the temperature, thereby limiting the ability of new entrants to deploy satellites in service.

Lockheed Martin submits that the interference temperature model should be applied, if at all, only to new, unencumbered spectrum allocations. Further, the Commission should authorize an unlicensed “underlay” in a particular band only after the proposed unlicensed use has demonstrated that it will not operate in a manner that will cause interference to the licensed users.¹⁰

V. ACCESS TO UNLICENSED SPECTRUM

One of the overriding objectives of the *Report* is to find ways for new entrants to gain improved access to unlicensed spectrum.¹¹ The *Report* notes, however, that while there is great interest in making available additional unlicensed spectrum, there is no consensus on how such spectrum should be obtained, especially in frequencies below 5 GHz.¹² To that end, the *Report* encourages the Commission to “pay careful attention to legitimate concerns of other spectrum users.”¹³ The *Report* also suggests that with regard to spectrum above 50 GHz, the Commission should routinely review whether licensing is in fact necessary.¹⁴

¹⁰ In this regard, the *Task Force Report* is ambiguous as to whether the interference temperature model would be applied to existing services. The *Report* states that the interference temperature concept should be applied only to “new spectrum allocations and assignments.” *Task Force Report* at 53. The *Report* also states, however, that the Commission should implement the proposals contained in the *Report* “in both newly allocated bands and in spectrum that is already occupied, but in the latter case, appropriate transitional mechanisms should be employed to avoid degradation of existing services and uses.” *Id.* at 3. Should the Commission consider adopting the interference temperature model, Lockheed Martin urges the Commission to make clear that the interference temperature model would not be applied to spectrum occupied by incumbent licensed uses.

¹¹ *Task Force Report* at 54.

¹² *Id.*

¹³ *Id.* at 55.

¹⁴ *Id.*

Lockheed Martin supports development of unlicensed uses in the higher spectrum bands which do not have incumbent licensed uses. In Lockheed Martin's view, the Commission has focused too strongly on unlicensed uses of congested lower spectrum bands, such as 5 GHz. Instead, the Commission should refocus its efforts on providing exclusive access to a defined set of frequencies in higher unencumbered bands on an unlicensed basis. Further, such spectrum should be made available in a few large, contiguous segments consistent with the Commission's trend of awarding licenses for commercial spectrum on nationwide or regional bases. Lockheed Martin believes that permitting unlicensed access to wide swaths of unencumbered spectrum could effectively promote investment and research in, and development of these bands, leading to the future expansion of commercially viable spectrum.¹⁵

VI. PROPOSED MODIFICATION TO THE ORBIT ACT

The *Report* recommends that the Commission seek new legislation to permit the use of auctions to resolve mutually exclusive applications for global and international satellite services, albeit with no real justification or analysis of the substantive rationale behind the existing statutory prohibition on auctioning of spectrum for such services.¹⁶ The *Report* suggests that amending the Open-Market Reorganization for the Betterment of International Telecommunications Act of 2000 (the "ORBIT Act") in this way would "provide more flexibility in allocating and licensing spectrum used to provide satellite services."¹⁷ As a general matter, Lockheed Martin opposes the Task Force's recommendation that the Commission seek legislation to amend the ORBIT Act to permit the auctioning of spectrum for international or global satellite services.

¹⁵ An example of this phenomenon can be found in the extraordinary development of consumer products that arose from the United States' satellite and space programs.

¹⁶ Task Force Report at 42.

¹⁷ *Id.*

First, the Task Force proposal appears to be based on an assumption that the satellite industry has an interest in securing licenses that provide for full, flexible use of satellite spectrum. This assumption is wholly unfounded. With the minor exception of certain providers in the Mobile Satellite Service (MSS), the satellite industry as a whole has demonstrated no desire for any flexible use of their spectrum, let alone the flexibility attributed to terrestrial wireless interests.¹⁸

Second, international and global satellite spectrum was originally exempted from auctioning for specific, sound public policy reasons which are even more valid today. Section 647 of the ORBIT Act provides that:

Notwithstanding any other provision of law, the Commission shall not have the authority to assign by competitive bidding orbital location or spectrum used for the provision of international or global satellite communications services.¹⁹

The legislative history of this provision makes clear that Congress was concerned that if the FCC auctioned international spectrum and orbit slots, it would “open[] the door and allow[] countries around the globe to conduct such auctions” resulting in “a dramatic, negative impact upon the development of global competition in the industry.”²⁰ The Commission concurred with this assessment, concluding that auctioning spectrum for satellite services “opens the possibility of a hold up by some later country

¹⁸ Two MSS operators have proposed to integrate a terrestrial service component with their satellite networks, using assigned MSS frequencies to augment signals in areas where the satellite signal is attenuated. *See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band*, 16 F.C.C.R. 15532 (2001). The MSS industry, itself, however, is not united behind this proposal. Indeed, Inmarsat Ventures plc, and Iridium, both MSS providers, oppose the grant of partial flexibility to MSS spectrum. *See* IB Docket No. 01-185, Comments of Inmarsat Ventures plc (filed October 19, 2001); Comments of Iridium at 2-3 (filed October 19, 2001).

¹⁹ ORBIT Act, § 647, 114 Stat. at 57 (*codified at* 47 U.S.C. § 765(f)).

²⁰ *See* Hearings on Satellites and the Telecommunications Act Before the Senate Commerce, Science and Transportation Subcomm. on Communications, 105th Cong. (Jul. 30, 1997) (Statement of Chairman Conrad Burns), *referenced in* S. 376 Report, S. Rep. No. 106-100 (Jun. 30, 1999).

that is the vital final piece, [which] sets auction terms that are unfair and capricious and thus lead[] to distortions in the marketplace.”²¹

The *Report* offers no evidence that either undermines the continuing validity of the Commission's previously articulated policy statement to Congress or justifies the substitution of the Task Force's view for that of Congress; nor can it. The fact remains that the domestic and international financial and business repercussions and uncertainties associated with global and international satellite spectrum auctions could undermine the leadership of the United States in the satellite field. Moreover, the current approach has enabled the development and deployment of an overall successful, state of the art satellite industry. Lockheed Martin believes that subjecting such enterprises to the uncertainties of an auction dynamic – whether sequential or global – could seriously jeopardize continued commercial research and development in the higher spectrum bands, as well as curtail current plans for investment in and expansion of such satellite systems. In sum, while the policy reasons for adopting the “no auction” provision of the ORBIT Act remain unchanged and are actually even more relevant today, there are no similarly significant countervailing reasons to amend the Act to subject global and international satellite spectrum to auction.

CONCLUSION

For the foregoing reasons, the Commission should reject the interference temperature model as set forth by the Task Force, including the consideration of the development of easements and underlays, as inconsistent with exclusive licensing. The Commission should improve access to unlicensed spectrum in the higher bands to promote the kind of research and development that could lead to exploitation of currently unencumbered spectrum. With regard to spectrum allocation models, the Commission should recognize that there can be no “one size fits all” allocation model. Spectrum alloca-

²¹ *Id.* (Statement of Peter Cowhey, Chief, FCC International Bureau).

tions must be determined on an individual basis considering the proposed services, the technical nature of the spectrum and concerns regarding incumbent licensees. Regardless of the allocation model, however, the Commission should ensure that incumbent licensees with exclusive rights should not be subject to unlicensed underlays or easements. Finally, as a general matter, Lockheed Martin opposes the Task Force's recommendation that the Commission seek legislation to amend the ORBIT Act to permit the auctioning of spectrum for international or global satellite services.

Respectfully submitted,

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